MacroSystems Biology and Early NEON Science: Research on Biological Systems at Regional to Continental Scales

PROGRAM SOLICITATION
NSF 16-521

REPLACES DOCUMENT(S):
NSF 12-532, NSF 10-555

National Science Foundation

Directorate for Biological Sciences
Emerging Frontiers

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

March 15, 2016

October 17, 2016

Third Monday in October, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

The proposal category for exploratory or incubation grants was removed.

Two new proposal categories were added: Early Career Awards (MSB-ECA) and Early NEON Science Awards (MSB-ENSA).

A special review criterion for the evaluation of the extent to which NEON data is used or results generated will be useful in enhancing NEON as a research instrument was added.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 16-1), which is effective for proposals submitted, or due, on or after January 25, 2016. Please be advised that proposers who opt to submit prior to January 25, 2016, must also follow the guidelines contained in NSF 16-1.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

MacroSystems Biology and Early NEON Science
Research on Biological Systems at Regional to Continental Scales

Synopsis of Program:

The MacroSystems Biology and Early NEON Science: Research on Biological Systems at Regional to Continental Scales program will support quantitative, interdisciplinary, systems-oriented research on biosphere processes and their complex interactions with climate, land use, and invasive species at regional to continental scales as well as planning, training, and development activities to enable groups to conduct MacroSystems Biology and Early NEON Science research.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Elizabeth R. Blood, telephone: (703) 292-8400, email: eblood@nsf.gov
- Timothy K. Kratz, telephone: (703) 292-7346, email: tkratz@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 10 to 15

Anticipated Funding Amount: $10,000,000 to $15,000,000

Three categories of awards will be made:

Category 1: Early Career Awards (ECA). Awards to early career scientists employing innovative and creative approaches to advance understanding of regional to continental scale processes and cross-scale interactions. These awards will be limited to a maximum of $300,000 over a two year duration.

Category 2: Full Research Awards (FRA). Awards to support Macrosystems Biology Research or Innovative Training to conduct MacroSystems research. These awards may be up to 5 years in duration.

Category 3: Early NEON Science Awards (ENSA). Grants that do not otherwise fit into the macrosystems biology focus on regional to continental scale questions, but 1) use or leverage NEON data and/or NEON samples/specimens to address innovative ecological or other biological questions, and/or 2) develop analytic or computational tools that enhance the use and value of NEON data. These awards may be up to 5 years in duration.

Budget and duration for each type of award should reflect the scope and complexity of the work proposed.

Anticipated funding amount is pending the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits for Categories 2 and 3.

For Category 1: Early Career Awards (MSB-ECA) only: Individuals must hold an appointment as an Assistant Professor or equivalent at a U.S. academic or non-profit research institution at the time of proposal submission. Proposers must hold a doctorate degree by the deadline date and be untenured until October 1 following the deadline.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI:

There are no restrictions or limits.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  March 15, 2016

  October 17, 2016

Third Monday in October, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

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I. INTRODUCTION

The biosphere has changed more in the past 50 years than during any time in human history. Climate change, land use change, and the introduction of invasive species collectively affect living systems by altering the fundamental relationships between life and the non-living environment that sustains it. Many of the changes challenge our understanding of how the biosphere works - how the ecological systems on which we depend will respond to changes in climate, land use, biodiversity, and a host of related environmental factors. Our current understanding of the biosphere is largely based on knowledge derived either from small plot research or from satellite-scale remote sensing. However, the basic scientific knowledge needed to understand the biosphere at regional to continental and annual to decadal scales, to quantify the strong and weak forces regulating the biosphere, and to predict the consequences of climate and land use change and invasive species on living systems is difficult to extrapolate from studies conducted at local or global scales.

A major challenge in developing a predictive capability is that biosphere responses are often non-linear and can involve contagious spread of organisms and diseases from local to continental scales, with the most extreme impacts in zones where multiple factors converge. Large and often unpredictable changes in the biosphere can result from the interplay between fine-scale patterns and processes coupled with broad scale dynamics. These cross-scale interactions contribute to the observed non-linear dynamics and may be accompanied by abrupt threshold responses. Because many of these responses and feedbacks occur at regional to continental scales, they cannot be investigated by disconnected studies of individual ecosystems or short periods of observation. Therefore the MacroSystems Biology and Early NEON Science: Research on Biological Systems at Regional to Continental Scales program solicits proposals that will develop new conceptual frameworks, empirical studies, and modeling that are applicable for studying the biosphere at regional to continental scales and developing the ability to forecast future change. NSF is supporting construction of the National Ecological Observatory Network (NEON), which will offer the measurements, flexible operation, and research capability needed to assess long-term biosphere change and vastly expand our knowledge of regional and continental scale biology. When complete, the NEON observatory will collect and provide high-quality, standardized data from 82 sites across the U.S. using instrument measurements and field sampling. The sites have been selected strategically to represent different regions of vegetation, landforms, climate, ecosystem performance, and gradients of change. NEON's site-based, remotely sensed and continental-scale data are provided as a range of scaled data products that can be used to describe changes in the nation's ecosystem through space and time.

Several NEON sites are nearing completion and have begun operations; many more sites will be completed during the coming year. Provisional NEON data from sites and airborne observations, along with protocols and documentation, are now available on the NEON Data Portal. In addition, NEON-collected specimens and samples are available and can be requested for research purposes. Proposals in all categories to use NEON data are encouraged, but except for Category 3 it is not a requirement that proposals include use of or develop tools to use NEON data.

II. PROGRAM DESCRIPTION

The National Science Foundation invites proposals from individuals or interdisciplinary teams of scientists to conduct innovative, integrated, systems-oriented macroscale biology ("MacroSystems Biology") research to detect, understand, and forecast the consequences of climate and land use change and invasive species on the biosphere at regional to continental scales. Proposals should address the scales where the ecological research challenges are the greatest and where research has the greatest potential to transform the field of ecology by addressing issues that have long hindered development of large-scale ecological research. Projects should strive to provide a mechanistic understanding of how multiple scale dynamics contribute to the structure, functioning, and change of the biosphere and lead to the development of a more predictive understanding of ecological change. Proposals should be well grounded in theory, include novel approaches that will result in a theoretical framework for a predictive understanding of macroscale biology, and show great promise for enhancing basic theoretical understandings.

Proposals should include quantitative research approaches such as mathematical or computational models, numerical simulations, artificial intelligence techniques, statistics, visualization, or database development. Proposals are encouraged for the development and/or integration of macrosystems models (e.g., data-assimilation, biological, ecological, environmental) that connect local, regional, and continental scales. These models should address key problems linking ecological and evolutionary processes over a variety of spatial and temporal scales. Projects should develop theoretical foundations that will be useful for modeling based on either existing data and/or data to be collected by existing or planned environmental observatories. Mathematical models should include appropriate estimates of uncertainty, and experiments should assess power and precision.

Proposals that make use of current or planned data from the National Ecological Observatory Network (NEON), develop tools or value-added products from NEON data, or serve to develop a community of users that will make use of NEON data are especially encouraged. In addition to NEON, proposals may leverage existing research networks (i.e., The Long Term Ecological Research (LTER) Network), research sites (i.e., Critical Zone Observatories - CZO), field stations, synthesis centers, ongoing and proposed academic and federal programs, and research observatories such as the Ocean Observing Initiative (OOI). In all cases, however, proposals must clearly demonstrate how the research will develop fundamentally new knowledge and enhance theory.

The MacroSystems Biology and Early NEON Science program supports research that may include natural, managed, and disturbed ecosystems, including those in terrestrial, freshwater, wetland, coastal (including salt marsh and mangrove), and human-dominated environments. For proposals with marine (deep ocean) study sites, the PI should contact a MacroSystem Biology and Early NEON Science Program Officer prior to submission to determine if it should be referred to the Biological Oceanography Program in the Division of Ocean Sciences.

Proposals from early career scientists are especially encouraged through the creation of Category 1: Early Career Awards (ECA). Proposals in this category should use innovative and creative approaches to advance understanding of regional to continental scale processes and cross-scale interactions. To be eligible for this category the PI must hold an appointment as an Assistant Professor or equivalent at the time of proposal submission. Proposers must hold a doctorate degree by the deadline date and be untenured until October 1 following the deadline. As long as the PI meets this eligibility requirement, co-PIs and other senior personnel may be included. These awards will be limited to a maximum of $300,000 over a two year duration. Early career scientists are not precluded from submitting proposals in other categories.

Category 2: Full Research Awards (FRA) are grants open to all PIs regardless of career stage and may have a larger budget and longer duration, as appropriate, to support Macrosystems Biology Research or Innovative Training to conduct MacroSystems research. These awards may be up to 5 years in duration.

The study of regional to continental scale dynamics may involve research at multiple sites, locations or ecosystems. It must be explicit in category 1 and 2 proposals how the suite of sites proposed will elucidate regional or continental scale theory. Proposals in categories 1 and 2 that lack a regional or continental scale framework (e.g., proposals that are simply inter-site comparisons or multi-site analyses of general ecosystem concepts or theories) will not be considered and returned without review.

Early NEON data are becoming more available and proposals that 1) use or leverage NEON data and/or NEON samples/specimens to address innovative ecological or other biological questions, and/or 2) develop analytic or computational tools that enhance the use and value of NEON data are strongly encouraged through the creation of Category 3 awards. Category 3 awards are intended to support proposed work that fits one or more of these two criteria but do not focus primarily on the regional to continental questions that are fundamental to macrosystem biology. Proposals for tool development that are broader than or only indirectly applicable to NEON may be more appropriate for the Advanced Biological Infrastructure (NSF 15-582) or the Software Infrastructure for Sustained Innovation (NSF 15-553) programs. Proposals in this category that plan to use NEON resources that are not yet available must include a letter of support from the NEON Project management organization that attests to the anticipated availability of these resources. See http://www.neoninc.org/data-resources/information-for-researchers for further instructions on obtaining this letter.

Proposals in all categories should contain innovative approaches to develop the capabilities of people and/or tools needed to advance these areas of research in the future, so that the next generation of researchers will learn to work in diverse teams across disciplinary and international boundaries, and use advanced sensing and monitoring, communication, and information technologies to work across many scales of time and space.

For all categories of awards we encourage expansion of the NSF's required post-doctoral mentoring opportunities to provide innovative training of the next generation of MacroSystems scientists. Proposals involving post-docs must offer an innovative and forward thinking plan for post-doctoral training that extends beyond the mentoring that would normally occur as part of a single research project. Training opportunities could include short-courses, collaboratories, or other related activities (national or international). Sample topics might include leadership, large project management, application of statistical methods for integrating data across scales, analytical methods useful for macro-scale studies, or computational techniques for dealing with large, regional or continental datasets.

Regional to continental scale processes transcend international boundaries. The data, information, knowledge, and expertise to fully understand these dynamics may require international partnerships. Relevant and appropriate international partnerships are

encouraged through this solicitation and other NSF solicitations to conduct collaborative research and to build collaborations (e.g., Research Coordination Networks). Funding guidelines for involving international collaborators include:

- Travel expenses for US scientists and students participating in exchange visits integral to the project.
- Project-related expenses for international partners to engage in research activities while in the United States as a project participant. **No funding will be provided directly to international partners to support research activities.**
- Project-related expenses for US participants to engage in research activities while abroad as a project participant.

Supplemental Funding Requests

December 1 annually (or next business day if that is a weekend or holiday) is the deadline date for Research Experience for Teachers, Research Assistantships for High School Students, and Research Opportunity Award educational supplement requests. Guidance for PIs preparing supplemental requests is posted at: http://www.nsf.gov/bio/supp.jsp. Projects anticipating the inclusion of undergraduate research experiences are encouraged to include Research Experience for Undergraduates support as part of the research proposal itself, rather than as a supplemental request.

Conferences

The MacroSystems Biology and Early NEON Science program supports conferences that bring experts together to discuss current research, to expose other researchers or students to new research methods and approaches, and to discuss future directions of major research activities in regional to continental scale Biology or fundamental underlying theories (e.g. scaling). Conferences will be supported only if equivalent results cannot be achieved at regular meetings of professional societies or an established conference series. PIs should contact a MacroSystems Biology and Early NEON Science Program Officer before submitting a proposal for a conference/workshop. More information about submission of these proposals can be found at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.

III. AWARD INFORMATION

Anticipated Type of Award: Continuing Grant or Standard Grant

Estimated Number of Awards: 10 to 15

Anticipated Funding Amount: $10,000,000 to $15,000,000

Three categories of awards will be made:

Category 1: Early Career Awards (ECA). Awards to early career scientists employing innovative and creative approaches to advance understanding of regional to continental scale processes and cross-scale interactions. These awards will be limited to a maximum of $300,000 over a two year duration.

Category 2: Full Research Awards (FRA). Awards to support Macrosystems Biology Research or Innovative Training to conduct MacroSystems research. These awards may be up to 5 years in duration.

Category 3: Early NEON Science Awards (ENSA). Grants that do not otherwise fit into the macrosystems biology focus on regional to continental scale questions, but 1) use or leverage NEON data and/or NEON samples/specimens to address innovative ecological or other biological questions, and/or 2) develop analytic or computational tools that enhance the use and value of NEON data. These awards may be up to 5 years in duration.

Budget and duration for each type of award should reflect the scope and complexity of the work proposed.

Anticipated funding amount is pending the availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits for Categories 2 and 3.

For Category 1: Early Career Awards (MSB-ECA) only: Individuals must hold an appointment as an Assistant Professor or equivalent at a U.S. academic or non-profit research institution at the time of proposal submission. Proposers must hold a doctorate degree by the deadline date and be untenured until October 1 following the deadline.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI:

There are no restrictions or limits.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.5 of the Grant Proposal Guide provides additional information on collaborative proposals.

See Chapter II.C.2 of the GPG for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions.

The information below supplements the standard proposal preparation guidelines in the GPG and the NSF Grants.gov Application Guide. It pertains to all submissions.

Proposal Cover Sheet. Indicate the solicitation number in the PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE block. Grants.gov Users: The program solicitation number will be pre-populated by Grants.gov on the NSF Grant Application Cover Page. If your project includes international activities, you must check the box for "International Cooperative Activities Country Name" that appears under Other Information when the "remainder of cover sheet" is clicked, then select the countries involved.

The proposal title must start with "MSB-ECA:", "MSB-FRA:", or "MSB-ENSA:" for category 1, 2, and 3 proposals, respectively. For Collaborative Proposals, start the title with "Collaborative Proposal:" followed by "MSB-ECA:", "MSB-FRA:", or "MSB-ENSA:" as appropriate.

NOTE: For all proposals, a starting date of October 15 or later should be requested for 2016 and April 15 or later for 2017 and beyond.

Project Summary. The project summary consists of an overview, a statement on the intellectual merit of the proposed activity, and a statement on the broader impacts of the proposed activity. Provide a summary description of the project, including its research or development theme and key innovative features, in a manner that will be informative to a general technical audience. In the overview include the title of the project, the name of the principal investigator, and the lead organization. Also list all other participating institutions/organizations, including international collaborators. If the project includes international activities, those activities should be described in the overview. Proposals that do not contain the Project Summary, including an overview and separate statements on intellectual merit and broader impacts will not be accepted by FastLane or will be returned without review.

Project Description. Project Descriptions are limited to 15 pages total, including the two specific required parts described below. This 15 page limit does not include pages devoted to references, biographical sketches, the project budget, or supplementary documentation. The project description includes:

a. Results of Prior NSF Support: Proposals must include relevant results from prior NSF support.

b. Description of Research and Education Activities: The description should provide a clear statement of the research and education activities to be undertaken. It should include the empirical and theoretical foundations of the work, with reference to relevant work of the applicants and others; details of the methods to be used; and explain the significance of the outcomes. The narrative should reflect the intellectual merit of the work, its innovativeness, and responsiveness to the objectives of the solicitation. As appropriate, a clear description of qualitative, quantitative, or experimental methods and procedures should be included. Projects involving international collaborations or other activities should describe them here.

Please note that per guidance in the GPG, the Project Description must contain, as a separate section within the narrative, a discussion of the broader impacts of the proposed activities. You can decide where to include this section within the Project Description.

Biographical Sketches. Each proposal must include biographical sketches for all senior investigators, and also include biographical sketches for principal foreign collaborators. All biographical sketches must adhere to the format given in the GPG.

Project Budget. Budgets for each type of award should reflect the scope and complexity of the work proposed. Budgets for Category 1 proposals must not exceed $300,000, including indirect costs. For undergraduate and graduate student participants and postdoctoral associates, include a breakdown of costs by types of participants. Funds to cover the cost of attendance of the PI at an annual awardee meeting in Arlington, VA should be requested.

Proposals Involving Collaborators at Foreign Organizations. Proposers are reminded they must provide biographical sketches of all senior project personnel, including those at foreign organizations. In addition, as supplementary documentation, proposals involving foreign collaborators should provide documentation of a willingness to collaborate through letters of commitment from the international counterpart organizations. Please note that although eligibility for this competition is restricted to US organizations collaborations with foreign organizations may be considered.

Projects with international activities should include: a) details on the complementary expertise of the US and foreign partners; b) a description of the proposed contributions and division of labor among participating researchers and institutions; c) plans for involving US students and junior researchers.

Supplementary Documents

1. Data Management and Access Plan (up to 5 pages commensurate with complexity of project)

All NSF proposals must describe plans for data management and sharing of the products of research. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. The Directorate for Biological Sciences guidance for data management plans is available at: http://www.nsf.gov/bio/biodmp.jsp. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

Because MacroSystems Biology and Early NEON Science research may involve significant data collection, harvesting, integration, assimilation, and modeling among large collaborations, the MacroSystems Biology and Early NEON Science data management and access plan should contain detailed descriptions of the data sets that will be collected or collated, including their sources and plans for interpretation or analysis, for preservation, documentation, and sharing of data, samples, and physical collections, and for their final disposition. Particular attention should be paid to data archival and longer term availability. The data management plan also should include the models, their data sources, and model calibration and validation information. It should not contain an elaboration of model theory, equations, or algorithms that belong in the Project Description. The NSF encourages appointment of a data management coordinator where appropriate. This supplementary document must be labeled "**Data Management Plan**". The NSF Fastlane system will accept Data Management Plans greater than the two page limit indicated in the GPG. Do not be concerned by any notification of the two page limit.

2. Project Management Plan (up to 5 pages commensurate with the complexity of the project)

All Projects must provide a description of the management plan for coordinating activities, particularly those projects involving multiple investigators and multiple institutions.

This description should include plans for internal communication, coordination of data and information management, evaluation and assessment of progress, allocation of funds and personnel, and other specific issues relevant to the proposed activities.

A table summarizing the role of each investigator is required including PI, co-PIs, other senior personnel, and paid consultants at all organizations involved. The time commitment of each key project member should be indicated in the management plan, regardless of any request for his/her salary from NSF.

Coordination and how the project will be managed within and across organizations and disciplines should be clearly defined, including identification of the specific coordination mechanisms that will enable cross-institution and/or cross-discipline scientific integration (e.g., regular meetings or teleconferencing, yearly workshops, graduate student exchange, project meetings at conferences, videoconferences, etc.).

A timetable with yearly goals should be provided that includes benchmarks for the major anticipated project milestones and deliverables and expected dates for their release.

3. Postdoctoral Researcher Mentoring Plan (1 page maximum)

Each proposal that includes funding for one or more post-docs must include a mentoring plan that explicitly states the roles of the post-doc as well as how they will interact with the other project personnel. Innovative and forward thinking plans that will help advance development of a generation of early career scientists able to conduct team research at regional to continental scales are strongly encouraged. See GPG, Chapter II.C.2.j for additional information on postdoctoral researcher mentoring plans. This supplementary document must be labeled "**Postdoctoral Researcher Mentoring Plan**".

4. Letters of Collaboration.

Proposals in any category that plan to use NEON resources that are not yet available must include a letter of support from the NEON Project management organization, submitted as a supplementary document, that attests to the anticipated availability of these resources. See http://www.neoninc.org/data-resources/information-for-researchers for further instructions on obtaining this letter. This letter does not need to conform to the format described below.

Supplementary Documents may also include letters of collaboration from other individuals or organizations that are integral to the proposed project but are neither senior personnel nor supported by subawards. This may include subsidiary involvement in some aspect of the project, cooperation on outreach efforts, or documentation of permission to access materials or data. Letters of collaboration should focus solely on affirming that the individual or organization is willing to collaborate on the project as specified in the project description. No endorsements of the potential value or significance of the project may be included. The template that **must** be used for the preparation of letters of collaboration, other than those from the NEON Project management organization, is provided below.

Each letter of collaboration **must** be signed by the designated collaborator. Requests to collaborators for letters of collaboration should be made by the PI well in advance of the proposal submission deadline, because they **must** be included at the time of the proposal submission. **Letters deviating from this template will not be accepted and may be grounds for returning the proposal without review.**

Template to be used for letters of collaboration:

To: NSF Macrosystems Biology and Early NEON Science Program

From: _____

(Printed name of the individual collaborator or name of the organization and name and position of the official submitting this memo)

By signing below (or substitute: transmitting electronically), I acknowledge that I am listed as a collaborator (or substitute:contributor) on this proposal, entitled "_____(proposal title)_____," with _____(PI name)_____ as the Principal Investigator. I agree to _____(description up to 140 characters)_____, as described in the project description of the proposal, and I commit to provide or make available the resources specified therein.

Signed: _____

Organization: _____

Date: _____

Please note that generic letters of general support are not allowed.

5. BIO Proposal Classification Form

Applicants must complete the Proposal Classification Form. The Proposal Classification Form is required for all submissions to BIO; FastLane will not allow processing of the proposal without it.

6. Conflicts of Interest File (to be emailed): Provide one list for the entire project (including any and all collaborative proposals) in an alphabetized table, of the full names and institutional affiliations of all persons with potential conflicts of interest as specified in NSF's Grant Proposal Guide. For each PI, Co-PI and other Senior Personnel, include all co-authors/editors and collaborators (within the past 48 months), all graduate advisors and advisees, spouse or relative, and any other individuals or institutions with which the investigator has financial ties (please specify type). Do not include the names of people with whom you do not have conflicts as this may unnecessarily limit qualified reviewers. In addition, list all subawardees who would receive funds through the MacroSystems Biology award. The list as an excel file should be named with the Lead PI's last name followed by the NSF proposal number and emailed to MSB-NEON@nsf.gov immediately after you submit your proposal, but no later than the proposal deadline.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

Other Budgetary Limitations:

Other budgetary limitations apply. Please see the full text of this solicitation for further information

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  March 15, 2016

  October 17, 2016

  Third Monday in October, Annually Thereafter

D. FastLane / Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.i. contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.i., prior to the

review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and<
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to responding to the standard NSF review criteria, reviewers will be asked to place emphasis on the extent to which:

- The proposal is well grounded in theory, includes novel approaches that will result in a theoretical framework for a predictive understanding of macroscale biology, and shows great promise for enhancing basic theoretical understandings.
- For Category 2 proposals, the proposals are highly interdisciplinary and broadly integrate across relevant biological, atmospheric, geological, social, mathematical, and engineering disciplines. The interdisciplinary research is expected to be reflected in the Principal Investigators involved in the project. Projects are encouraged to promote the development of collaborative partnerships with other research platforms, observatories, research centers, or networks.
- The proposal addresses the inherent complexity and highly connected nature of the biosphere, includes multi-scale perspectives, is focused on understanding processes at regional to continental scales, and places a high priority on scaling and integrating the results from observations at one scale to better understand processes and dynamics at other scales.
- The proposal includes quantitative approaches, advanced conceptual models, data assimilation, or other modeling approaches to study the systems chosen for investigation.
- For Category 3 proposals, the proposals use NEON data or develop collaborations, tools, data products, or theoretical constructs that will enhance future use of the NEON instrument.

In accordance with the NSF Proposal & Award Policies & Procedures Guide, all proposals submitted in response to this solicitation must explicitly address the Broader Impacts criterion. Although proposed Broader Impacts activities in any of the identified categories are acceptable, investigators are especially encouraged to undertake activities that effectively address goals and challenges associated with one or more of the following key areas:

- recruitment, education, and training of the future scientific, engineering, technical, and policy workforce and leadership needed to pursue basic research on regional to continental scale biology;
- innovative and collaborative post-doctoral leadership fellows with project management, leadership, technological and collaborative training and opportunities;
- tools and infrastructure to provide government and industry policymakers with current knowledge on issues related to regional to continental scale processes affecting the biosphere and associated biological feedbacks, so as to better inform decisions on adaptation and mitigation;
- improved public awareness and understanding of the interconnections between the biosphere, climate change, and sustainability and their impacts, and technical strategies for adaptation and mitigation;
- opportunities to engage a diverse community of learners and educators in regional to continental scale research.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will be completed and submitted by each reviewer. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Elizabeth R. Blood, telephone: (703) 292-8400, email: eblood@nsf.gov
- Timothy K. Kratz, telephone: (703) 292-7346, email: tkratz@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: nsfpubs@nsf.gov

  or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
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